Africa RISING Project in Ethiopian Highlands Work Plans – 2018

Contents

Participatory evaluation of alternative forage options for ruminant livestock and poultry rearing

Justification

During Africa RISING phase I, selected forages technologies which have been evaluated through on-farm action researches, received very good acceptance by farmers and created awareness as well as demand for improved forage cultivation and utilization. The forages tested in phase I were limited to few options which are typically suitable for highland areas. This was done purposely in order to make the knowledge sharing process among farmers simpler. The approach proved effective and the awareness and demand of farmers for improved forage technologies increased in the intervention areas. As the Africa RISING zone of influence has widened to different agro-ecologies through development partners in phase II, there is a strong demand for different forage options that fit different agro-ecologies, farmer needs and growing niches. With this in mind, the R4D activity in the 2017 cropping season on-farm evaluation was conducted for sweet lupine and faba bean forage intercropping to compliment the previous years' trials, and new trials were initiated for alfalfa and fodder beet.

For the 2018 cropping season, additional evidences are required for the forages introduced in 2017 including alfalfa and fodder beet; as well as for sweet lupine in Sinana and Endamehoni sites. Moreover, to meet the growing forage demand, a new introduction and evaluation was found necessary for Brachiaria and Phalaris grass lines. These grasses can grow in high and middle altitude areas and can be integrated with NRM initiatives.

Desho grass is currently scaled to large number of households in different parts of the country. During discussions with experts and farmers in 2017, there was a request to find a way to minimize nutrient mining from Desho and other grass plots. To address this issue, it is proposed to intercrop Desho grass with vetch forage (legume) and evaluate the performance. In mid altitude areas, intercropping lablab with fodder/food maize can provide additional benefits and it is also found necessary to evaluate this forage combination in Africa RISING sites. The proposed grass and legume combinations would create alternative options for smallholders in different locations to adopt context specific forage technologies and improve their livestock productivity. As the forages have multiple functions including NRM roles, their contribution for the sustainable intensification of the mixed system would be paramount. Information will be generated on the growth performance biomass yield and economic benefits due to increased productivity and environmental impacts of the forage technologies.

On top of these forage options, engagement of households in improved village poultry is believed to positively impact women's access to and control over resources. Therefore, it is found necessary to work together with ILRI's chicken genetic gain program to introduce and pilot improved chicken breeds with improved management practices in selected technology villages of Africa RSIING sites. This introduction and demonstration would help to intensify home gardens which empowers women and landless youth to generate cash income and improve family nutrition.

Research Methods

For each of the forage trials, farmer groups will be formed based on interest and availability of land and resources to conduct the participatory forage evaluation. For alfalfa, availability of irrigation water will be used as additional criteria for farmer/plot selection. Standard procedures will be followed in the implementation of the evaluation trials, which includes trainings on agronomic practices: land preparation, plantation, management, propagation, seed collection and utilization of the forage biomass as green fodder or in the form of hay.

For each of the forage trials 20 farmers will be selected per site and evaluation will be conducted on a 10x10m2plot sizes per farmer by applying recommended agronomic practices. Farmer selection will be conducted with gender lens to make sure good representation of women and youth. During trainings women in male headed households will be given equal chance of participation.

For each trial, specific data sheets will be developed. Data on the adaptation of the forages, biomass yield and nutritional quality, short-term animal feeding responses, economic and environmental feasibility and farmers' feedback will be collected. Mid-season and end of season field days will be organized as a means to demonstrate the technologies and allow farmers evaluate the forage options.

For the village poultry pilot trial 5 farmers will be selected per site. Primary participants of this trial will be women and thus trainings and activities will be given to women and youth. About 10 improved layer chicken will be provided to each participant with complete package of housing and feeding facilities to start the pilot trial. Data will be collected for performance evaluation and cost benefit analysis.

Deliverables

Deliverable	Date due
Farmer selection for each of the forage trails	May, 2018
Report on the implementation of the forage trails	Aug., 2018
Mid-season performance evaluation report	Sept, 2018
A blog report on lessons learnt	Sept, 2018
Complete report on the forage adaptation trials and village poultry	Nov, 2018
A draft a comprehensive manuscript for development journal	Dec., 2018

Research Outcomes

Evidence will be generated on forage technology options that work well in the Africa RISING zone of influence through participatory forage species/variety selection. This will enable to develop additional forage technology packages for scaling through development partners in the Africa RISING sites. Availability of a variety of forage options would thus facilitate adoption of improved forage cultivation and utilization, as farmers can choose the technology that best fit their own farm context. Improved forage technology adoption is expected to directly and positively affect feed resource availability and

nutritional quality, which also directly relates to improved livestock productivity and income of farmers. On the other hand, the forage technologies will contribute to the environment through soil nutrient enrichment (forage legumes), carbon sequestration (on perennial forages) and control of soil erosion and water run offs, especially when they are planted on terraces/soil bunds. These latter functions imply that crop-livestock productivity can be improved in a more sustainable and cohesive way by integrating improved forages in the system.

Partners and Indicative Budget

Organization	Key contact	Indicative Budgets (USD)	
		Staff	Operational
ILRI	Aberra Adie, Melkamu Bezabih, Kindu Mekonnen, Peter Thorne		25,000.00 USD

Improving the productivity of wheat- based cropping system through diversifications in the highlands of Ethiopia

Justification

Highland cereals (bread wheat, durum wheat, food and malt barley), food legumes (faba bean, field pea, chickpea and lentil) and oil crops (Brassica and linseed) play vital role in food security, nutrition, incomes, and animal feed. Highland food legumes and edible oil crops are an important component in the wheat-based system in the highlands of Ethiopia. Since the productivity and production of wheat could not meet the demands of the increasing human of population, the county is importing millions of tons of bread wheat. Moreover, there is also huge imports of durum wheat and malt barley to meet the demands agro-industries. In order to boost wheat production, the government of Ethiopia has developed wheat strategy that gives the road map to increase both bread and durum wheat in regions where Africa RISING (AR) intervention sites in Tigray, Oromia, Southern and Amhara regions.

Although there are improved crop cultivars (developed from ICARDA and other CG center elite lines), and associated technologies developed by the national agricultural research system, the yield gap in wheat, pulses and oil crops is high in the highlands. The major factors for high yield gaps are unavailability of released crop varieties in different ago-ecologies; low productivity of the existing cultivars in the hands of farmers, mono-cropping of wheat, poor access to high quality seeds, insect pests, diseases (wheat rusts), poor crop management practices and currently increased acidity. In order to narrow the yield gaps of cereals and food legumes, extensive participatory variety trials (PVS), demonstrations and seed production were done during Phase-I of AR in the four regions and showed yield can be doubled with new improved crop varieties with appropriate agronomic practices and improving skills of farmers and development partners. Training of farmers and development partners will help to narrow their knowledge and skill gaps.

Evidence

In Phase-I of AR project, is was possible to identify crop cultivars with wide and specific adaptions with high yield through PVS, demonstration-cum-seed production. The first evidence, (although formal adoption study is required), the Durum wheat cv. Utuba was selected and adopted by over 900 male and female farmers in Bale region (>1400 ha of land was covered by the cultivar in 2017/18 cropping season in Sinana district) and its area coverage is increasing. The variety is not highly affected both stem and leaf rust rust and its productivity is higher than the existing bread wheat cultivars grown by farmers in the area. The inclusion of durum wheat in Bale Zone will reduce cost of production by avoiding repeated fungicide applications and drudgery workload to family member mainly women and youth to fetch water from distance area for pesticide spraying. Second, food legume cultivars were out of the traditional rotation system due to diseases, insect pests and low productivity/profitability and through the project, food legume cultivars with high yield were selected and being multiplied by farmers in the different sites. The faba bean cv. Gebelcho was produced by 292 farmers on 86 ha in 2017/18 cropping season in Bale zone. The high yielding crop cultivars also produce high straw yield which is key animal feed in the mixed

farming system. The project also improved farmers' knowledge and skills in modern crop production technologies through training and field days and created a very good linkage among partners through innovation platform established by the project.

Objectives

- To identify high yielding and pest resistant new crop cultivars with specific and wide adaptations suitable in the wheat-based cropping system
- To demonstrate bio-fertilizers and management of the new faba bean gall disease in central and northern highlands
- To identify high yield linseed and food oat cultivars tolerant to acid soils
- To produce high quality seeds for scaling and
- To publish research results

Approach

During the 2018/19 cropping season, new released crop cultivars will be evaluated in the four regions to select the most adapted and high yield cultivars suitable for farmers and industries through participatory variety selection (PVS). The PVS is an important approach to evaluate new released cultivars in many locations since the Research Centers in the national agricultural research system only test and release new cultivars in few agro-ecologies during variety verification stages. In order to incubate improved technologies, demonstrations and seed productions of cultivars selected in 2017/18 and before, demonstrations will be done many farmers fields in collaboration with the Bureau of Agriculture to organize field days and produce enough initial quality seeds for further scaling by development partners that can bring high technology impact in the future. In addition to demonstration of seed based technologies, Bio-fertilizers and fungicides (recommended by national program) will be validated under farer condition.

Partners

- Bureau of Agriculture
- Host farmers
- Research Centers in the four AR intervention sites
- Seed growers (farmer unions, Oromia Seed Enterprise)
- Menagesha Biotech PLC-Bio-fertilizer
- Dashen Malt and Raya Beer factories

Major Activities, deliverables

SN	Activities	Deliverables
1	Demonstration-cum-seed multiplications of farmer and industry preferred nine crop cultivars from 2018/19 season and Phase-1 PVS trials (faba bean, food and malt barley, chickpea, field pea) (Table 1) Demonstration of bio-fertilizer (inoculant) and faba bean gall disease management	On average a total of 40 t of seeds 9 cultivars with classes produced for 2019/2020 scaling by partners
2	PVS (Table 2)	1-2 cultivars identified and initial seeds produced for demonstration and seed production in 2019/2020
3	Field days organized by ILRI-AR Capacity development	One MSc student completed his Thesis research
4	Publications	Project progress and annual reports 1-2 manuscripts prepared and submitted to peer reviewed journal

Table 2. Participatory variety selection of food crops on-farmer fields in the four Africa RISING sites, 2018/19 cropping season

Crops/technologies	Cultivars	Sinana	Lemo	Debre Berhan	Maichew	Sub-total
Bread wheat	Hidase	0.5	0.5	-	-	1.0
	Huluka	0.5	-	-	-	0.5
Durum wheat	Utuba	0.5		0.85	-	1.35
Faba bean	Dosha	-	-	1.75		1.75
	Gebelcho	2.0	2.0	0.25	1.0	5.25
Field pea	Bilalo	-	-	-	1.0	1.0
Kabuli Chickpea	Habru	-	0.2	-	-	0.2
Food barley	HB1307	-	0.1	-	-	0.1
Malt Barley	IBON174	1.0	-	1.0	1.0	3.0
Sub-total		4.5	2.8	3.85	3.0	14.15
Bio-fertilizer (bags)	Faba bean	40	40	40	20	140
	Chickpea	-	8	-	-	8
Ridomil Gold (fungicide) in kg	Faba bean gall disease management	-	-	30	15	45

*= Demonstration –cum-seed production and technologies will be done in locations where cultivars were selected by farmers in 2017/18 cropping season of in Phase-I of the project

Crop	# of cultivars	Number of locations	Number of farmers hosting the trials	Design and plot size/cultivar	Key parameters to be measured
Durum wheat	7	4	8	Non-replicated (25 m2)	Agronomic disease and yield data Male and female framer evaluation data
Bread wheat	7				
Linseed	7				
Food oat	1	1	2		
Total	22	5	10		

Budget breakdown

Cost Category	July - September 2018 Amount USD	October - December 2018 Amount USD	January-March 2019 Amount USD	Total Amount USD
Personnel Costs				
Zewdie Bishaw	2,250	1,500	1,500	5,250
Seid A. Kemal	9,000	9,000	3,600	21,600
Yetsedaw Aynewa	6,600	6,600	6,600	19,800
Operating Costs				
Consultant	1,000	2,000	-	3,000
Casual Labor for on-farm research (PVS and Demonstration) management	2,000	2,000	500	4,500
Supplies & Services (pesticides, expert supports from NARS, land compensation, car rent, trial management) for PVS, demonstration ad Scaling, office supplies	5,000	2,971	-	7,971
Operational Travel (local and International for project team)	4,000	3,000	1,000	8,000
Workshop/Conference/field days	-	1,000	500	1,500
Capacity Building (graduate student)	3,000	1,747	-	4,747
Publication	-	-	1,000	1,000
IT Charges	1,422	1,404	1,296	4,122
Hosting Charges	390	360	180	930
Research quality (2 IRS staff= 150 USD/day/staff time)	1,950	1,800	900	4,650
Capital Items/Equipment	-	-	-	-
Total Direct Costs	36,612	33,382	17,076	87,070
Indirect Costs Recovery (14.85%)	5,437	4,957	2,536	12,930
Total Budget	42,049	38,339	19,612	100,000

Work plan (April 2018-March 2019

Major Activities	Apr - Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Febr	Mar
Site and farmer selections, seed distribution and PVS planting	X									
Trial planting of cereals, food legumes and oil seeds for diversifications		X	X	X						
Weeding and agronomic data collections; trial monitoring			X	X	X	X	X			
Farmer evaluations and field days						X	X	X		
Threshing						X	X	X		
Project report writing					X					X
Graduate student defense							X			
Manuscript preparations and submissions				X	X	X	X	X	X	X

*All costs for activities from April-June 2018 was covered by ILRI due to delay in budget release by the donor.

Scaling out small-scale mechanization in the Ethiopian Highlands

Institution: International Maize and Wheat Improvement Centre (CIMMYT)

Contact person: Dr. Walter Mupangwa (w.mupangwa@cgiar.org)

Background

CIMMYT is currently scaling out and conducting further generic research on small mechanization based on the two-wheel tractor (2 WT). The major partners in the scaling out activities are the Department of Mechanization in the Ministry of Agriculture and Natural Resources, regional bureaus of agriculture and Amio Engineering Pvt. Ltd. The technologies being scaled out are 2 WT based ploughing and planting, shelling and threshing, harvesting – walking harvesters, trailers for transportation, and water pumping using 2 WTs for irrigation of high value horticultural crops. The 2 WT based equipment available through CIMMYT and its partners include 8-20 HP 2 WTs, planters, disc ploughs, shellers, threshers, harvesters and trailers, and smallholder farmers are getting access to these technologies from service providers operating in their communities. The service providers received technical and agribusiness training from CIMMYT and its partners during 2017. In 2017 Amio Engineering also established a network of spare parts dealers who were linked to the service providers during implementation of project activities. Provision of different 2 WT based services has continued into 2018 in all project communities established in 2017 in addition to the phase 1 Africa-RISING sites.

Proposed activities for 2018

(1) Backstopping scaling out of small mechanization

Scaling out activities will include awareness/demand creation campaigns, field days at on-farm demonstration sites, learning/exposure visits for smallholder farmers and other stakeholders from woredas and kebeles around the project communities. In 2018 scaling out activities aim at reaching 2 000 farmers through direct planting, disc ploughing, transportation, awareness campaigns, field days, learning visits, and post-harvest processing of maize, wheat and teff crops. A summary of planned activities is outlined below.

#	Proposed Activity	Expected Outputs	Due date for output
1	Conducting on-field technical and agribusiness training of service providers, equipment operators and extension agents	A training report produced. Number of trainees. Number of business lines operated, and number of clients/farmers serviced by SPs after training.	30-Sept-18
2	Demonstrating the use of 2 WTs and its implements, and conducting field days with farmers,	Field day report detailing number of participants, types of services	30-Nov-18

#	Proposed Activity	Expected Outputs	Due date for output
	extension agents and other stakeholders in the 4 project regions	demonstrated, total hectarage of land ploughed and direct seeded by SPs	

(2) Generic research activities on small mechanization

Building on two-wheel tractor (2 WT) based direct planting started in phase 1, research on direct planting of maize and teff, and the productivity gains from direct seeding will be conducted in addition to the wheat crop. In phase 1 the focus was on wheat and pulses production, but currently small mechanization is also spreading into different woredas where other cereals e.g. maize and teff are commonly grown. Additionally, profitability of service provision for service providers and cost saving for smallholder farmers by using small mechanization options will continue to be evaluated, analyzed and documented in 2018. The proposed research activities are summarized below.

#	Proposed Activity	Expected Outputs	Due date for output
1	Implementing on-farm demonstrations on paired plots showcasing 2 WT based technologies: (1) setting up on-farm demonstrations on 2 WT planted maize, wheat and teff (2) Collecting crop yield data from on-farm demos (3) Collecting data on post-harvest processing: threshing of wheat and teff, and shelling of maize	(1) 8 on-farm demonstrations established and successfully run in 2018. (2) Crop yield and socio-economic data generated (3) Agronomy data and socio-economic uploaded to the Africa-RISING database	31-Dec-18
2	Conducting profitability studies on the service provision business models implemented in project sites: (1) Profitability of different 2 WT based services to farmers by individual and youth group service providers, (2) Cost savings by farmers hiring mechanization services from the service providers	(1) Profitability of service provision to individual and youth group service providers per each region evaluated and documented (2) Cost saving of using 2 WT driven services for smallholder farmers in the 4 regions evaluated and documented (3) Socio-economic data generated, documented and uploaded to the database	31-Dec-18

Budget details

Budget for proposed activities, administration and staff costs for 2018

Activity #	Activity	Budget (US$)	Notes
1	Conducting on-field technical and agribusiness training of service providers, equipment operators and extension agents	1 000.00	Costs include per diems, transport and accommodation for trainees and project staff; stationery, refreshments, training venue, fuel and oil for tractors
2	Demonstrating the use of 2 WTs and its implements, and conducting field days with farmers, extension agents and other stakeholders in the 4 project regions	2 000.00	Per diems, transport and accommodation for participants and project staff; refreshments; fuel and oil for tractors
3	Implementing on-farm demonstrations on paired plots showcasing 2 WT based technologies: (1) setting up on-farm demonstrations on 2 WT planted maize, wheat and teff (2) Collecting crop yield data (3) Collecting data from post-harvest processing - threshing of wheat and teff, shelling of maize	4 000.00	Costs include seed, fertilizer, agro-chemicals; fuel and oil for tractors; any equipment maintenance and repairs; labor costs for trial management and harvesting; per diem, accommodation and transport for project staff
	Total (US$) for operations	7 000.00	
	Staff and Administration costs (US$) up to 31 December 2018		
#	Category	Costs up to 31 December 2018	
1	Project staff		
	Agronomist (International staff) (15%)	9 000.00	
	Agribusiness Specialist (local staff) (30%)	5 545.45	
	Agronomist (local staff) (50%)	9 000.00	
	Total for staff costs	23 545.45	
2	Administration costs		
	Grant administration and reporting	2 196.00	
	Grant auditing	2 400.00	
	Office costs	600.00	
	Total for admin costs	5 196.00	

Activity #	Activity	Budget (US$)	Notes
	Sub-total (Operations + Administration costs) (US$)	35 741.45	
	Indirect costs (15%) (US$)	5 361.22	
	Grant Total Requested (US$)	41 102.67	

Resilience building through water and energy efficient water lifting and delivery system in sustainable intensification for smallholder farming systems in Ethiopia

Nature of the innovations to be scaled

With increasing interest to narrow down yield gaps and meet the food demand supply balance, the Government of Ethiopian (GOE) is highly committed to improving agricultural water management. These initiatives involve development and investments for sustainable agricultural production and productivity through increased access to stored, surface and/or groundwater for full or supplementary irrigation. Ethiopian government plan and programmes such as the Growth and Transformation Plan (GTP I and II) and climate resilient green economy (CRGE) initiatives clearly reflects these initiatives. In support to these endeavors, during PHASE I, Africa RISING (AR) project has tested and piloted several technologies related to water lifting and delivery, and on field water management for improved precision. An exemplary work in this regard is the introduction and testing of solar pump-based water lifting for smallholder's irrigation. With its 6 imported solar (PV) sets, AR demonstrated and evaluated the performances of solar pump-based water lifting technologies under smallholder setting in Ethiopia. With additional 4 solar (PV) demonstrated by the Livestock and Irrigation Value Chain for Ethiopian Smallholders (LIVES) project, the solar (PV) based water lifting technology was linked to different water delivery and application systems (e.g., furrow, drip and overhead application) to test which application methods lead to most efficient and maximum benefits with limited environmental impacts and less drudgery for women. The technology was also tested on a variety of crops including pepper, cabbage, carrot and fodder.

A feasibility analysis based on one cropping season data illustrate a strong financial viability of investments in solar pump-based irrigation, but with clear differences across crop type and water application techniques. Based on evidence from previous experiment, the maximum irrigable land size varies between 4431, 2188 and 2797 square meter (m2) if supported with drip, farrow and overhead water application techniques, respectively. This implies that the capacity of the solar pump can be doubled if drip system is attached to it. Moreover, it gives an opportunity for smallholders to share the initial investment cost or open an option for water delivery service provision for those who have capacity to invest but have limited land to irrigate. However, the level of feasibility proxied by the Net Present Value (NPV) and Internal Rate of Return (IRR) are different based on the level of discount rate and water application method.

Following AR-PHASE I, there are number of initiatives to pilot solar (PV) based irrigation. For example, Agricultural Transformation Agency (ATA) and IFAD and Ministry of Agriculture and Natural Resources, as part of PASIDP II, has a plan to develop decision support tool (e.g. suitability mapping) and piloting solar(PV)–drip based irrigation systems. A private sector called Solar Development PLC recently started to supply solar pump for irrigation in Ethiopia. The results of on farm action research under AR and LIVES were shared with these potential end-users (e.g. ATA, Solar development PLC and Ministry of Agriculture and Natural Resources and IFAD). IWMI team also facilitated the linkage between supplier and the implementers. From different sources IWMI has also allocated resources to develop solar pump suitability map and business model and the report on these are already published.

We strongly believe that these outputs and ongoing dissemination efforts will accelerate out scaling of the technologies, given that there is a good backstopping and monitoring of the implementation and performances of the technology.

Anticipated benefits from the widespread uptake of these innovations

- Building resilience through increases production, productivity whilst mitigation of crop failure through supplementary irrigation
- Increase land productivity and contribute to food security of smallholders
- The objectives of CRGE initiatives involve mitigation of carbon food print of agriculture and uptake of these solar (PV) based irrigation technology substantially contribute to this objectives
- Ensures access to nutrient dense food such as vegetables and fruits and animal products under irrigation condition
- Solar pump (PV) packaged with drip system reduces women drudgery related to irrigation water application

Research Questions

Research questions that will backstop the partnership.

- Although the key tasks requested immediately by ATA in relation to this proposal is impact assessment and technical guidance of overall investment , the following research questions, which are proposed as the key tasks of IWMI, are identified as they can back stop the implementers and suppliers and also accelerate out scaling process.
- What are the nutritional and income impacts of solar (PV) based irrigation systems? How can financing mechanism and operational modalities accelerate sustainable out scaling of solar (PV) based irrigation systems?
- Which policies, and institutions are needed to promote sustainable solar pump-based irrigation?
- What are the key opportunity-cost (environmental impacts such as depletion of aquifers, salinity etc) of adopting solar (PV) based irrigation systems and how can mitigation measures and policy implications be addressed?

Partnerships

List the partners who will be active, describe the contribution that they will make and how Africa RISING will support / backstop this with the research proposed. Also consider the comparative advantage offered by your partnerships. Make sure that you carefully consider roles and responsibilities of all partners.

The water and energy efficient water lifting, and delivery techniques proposed for out scaling under AR phase II is in line with the new initiatives of piloting solar (PV) based irrigation system by ATA in 16 districts of Ethiopia. IWMI team in Ethiopia has been contributing to the review and planning process of these new initiatives and more consultation going on. In principle ATA has agreed to use IWMI-AR team skills, knowledge and evidence generated during PHASE I of AR. They also request on the need of backstopping

and proper monitoring to answer key issues suggested under backstopping research questions above. ATA is well aware of the decision support tool (solar suitability map) being developed by IWMI to support proper targeting of potential areas. Hence, knowledge created through PHASE II of AR will be used as input to support ATA's initiative to further out scale solar (PV) beyond the current plan of 16 pilot districts.

In addition to IWMI's contribution towards the Ethiopian Government (ATA) initiative to demonstrate and scale up solar (PV) based irrigation, the private sector (the suppliers) will be benefit from the decision support tool developed by IWMI to target their potential client (suitability map). MoU is signed between IWMI and Solar Development PLC and already submitted to AR project coordinators. AR-IWMI will contribute through research, knowledge sharing, monitoring and evaluation (M&E), capacity building by focusing mainly on the proposed research question etc.

Impact Pathway

Ensure that the contribution to FtF goals (e.g. improved food security, better health and nutrition, inclusive agriculture sector growth) are stated

Activities	Outputs	Outcome	Impact
Knowledge sharing and awareness creation based on AR PHASE I experiences	Report on target landscape, associated technologies and farm households benefits / beneficiaries	Farmers, implementers, policy makers and suppliers better understood context specific water and energy efficient water lifting and delivery techniques	Partners adopted and implemented context specific water and energy efficient water lifting and application techniques
Support in targeting land scape (solar suitability map) and farm typology with key stakeholders			
Support in matching technology packages (solar (PV)-water delivery and application systems; crop type, inputs to landscape and farm types)			
Develop and test monitoring and baseline data collection tool for back stopping	Data collection protocol and tools	Improved adoption as scaling issues emerge earlier in project cycle and can be addressed by the implementer (ATA) and private company	
Implementation and collection of data related to research questions for backstopping and post	Water and energy efficient water lifting, and delivery techniques	Policy recommendations supporting solar (PV) based irrigation system adopted	Intervention farmers in eight districts will have improved food security, nutritional security and also domain farmers learn

Activities	Outputs	Outcome	Impact
implementation data for impact assessment	implemented in in 16 districts; and reports on: i) impacts on income, nutrition; ii) incentive structure, iii) service provision techniques, and iv) selected trade-offs completed		and adopt the interventions and approaches
Monitoring and evaluation	M&E report	Continuous learning and filtering of well performing business models	Better planning and implementation in the courses of continues up and out scaling of the approaches and the technologies

Targets / Zone of Influence

How many potential beneficiaries are out there? How many do you hope to materially impact on? Where are they?

This proposed work will be implemented in 16 districts of SNNPR and Oromia, Amhara and Tigray regional states.

Integrated Shallow Groundwater Irrigation Development Project-Promotion of Energy Efficient and Water Saving Technologies1

Region	Districts	Number of beneficiary households	Number of beneficiary people	Total irrigable land size (ha.)
Amhara	W/Dembia	10	50	2.5
	Takusa	10	50	2.5
	N/Mecha	10	50	2.5
	N/Achefer	10	50	2.5
Tigray	R/Azebo	10	50	2.5
	R/Alamata	10	50	2.5
Oromia	East-Showa	14	98	3.5
	Liben	14	98	3.5
SNNP	Awassa-Zuria	12	84	3.0
	Alicho Werero	12	84	3.0

[1] On average, a beneficiary household is expected to irrigate a quarter of a hectare

Region	Districts	Number of beneficiary households	Number of beneficiary people	Total irrigable land size (ha.)
	Sankurra	12	84	3.0
	Lemo	12	84	3.0
	Misrack Badawacho	12	84	3.0
	Angocha	12	84	3.0
Total		100	700	40

Arrangements Required for Monitoring and Evaluation

How will you generate and present the evidence that your partnership has been successful?

Monitoring and evaluation will be an important component of this proposed project and the mechanism for data collection on actual implementation is also indicated earlier. Probably important to mention is also the process monitoring which involves documentation of what is happening over time and evidences will be generated through engagement of partners and successful monitoring of deliverables. The indicator for process monitoring will evolve along implementation but an example may include:

- Number of technologies sets implemented, and farm households engaged;
- Areas of land irrigated and typed, and diversity of crops grown and their productivity performances;
- Number of events on experience exchange between the intervention and domain farmers
- The amount of capital invested as cost-sharing mechanisms (could be in kind)
- Impact on livelihoods using food security and nutrition indicators

Communications and Knowledge Management / Transfer

What arrangements will you put in place to communicate your activities and their benefits? What knowledge specific products and activities will you need to implement to support this.

- Stakeholder engagement and workshop for awareness raising
- Cross site learning events (to sites where the proposed technologies are working and also to sites which is very successful);
- Decision support tools for agricultural water management solution (solar suitability map);
- Publication
- Innovative communication tools like blogs, policy briefs, evidence briefs.

Budget details

Activity cost and deliverables for the project period of June -December 2018

	Explanation (type of costs)	Total USD	Deliverables	Indicators
1	A. Personnel (Experts time)	22950	Support to ATA in solar pump piloting: i) project design in 16 districts; ii) baseline survey tool development; iii) selecting and training of enumerators; iv) pretesting and undertaking the survey; v) Reporting the baseline survey focusing mainly on system characterization. Impact report will be after post implementation survey	Baseline survey tools; enumerators training mini report; field survey process report; baseline data; system characterization report
2	B. Service			
3	C. Supplies			
4	D. Operation			
5	E. Training and workshop			
6	F. Travel	2910		
Total direct costs		25860		
Indirect costs (16%) Fixed percentage charge over total direct costs		4138		
TOTAL USD		29, 998		

Creating climate-smart multifunctional landscapes through integrated soil, land and water management at different scales

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Introduction

Our experience in phase I of Africa RISING show that the types and spatial arrangement of watershed management interventions determine their level of success. We observed that some landscapes are resilient to drought compared to others irrespective of being within similar environmental conditions. Performances of interventions (SLM, SWC, water harvesting) also varied over short distances. In this phase, we will continue promoting sectoral/institutional integration and implementing complementary options across the landscape continuum to enhance both ecological, economic and socio-cultural benefits and ultimately sustain peoples' livelihoods and economic growth in a sustainable manner. We will also conduct action research in eight watersheds.

Major activities

Some of the core activities within the coming six months include the following (Table 1).

Scale technologies, frameworks, tools and models developed under Phase I:

We will continue to out-scale proven technologies and options to restore degraded landscapes, improve food and nutrition security, and enhance resilience to climate change. We will follow guideline to identify which combinations of technologies placed where will be more plausible from social, economic and environmental perspectives. Our approach will consider the landscape in an integrated manner in order to understand interactions, feedbacks and trade-offs and develop land use plans that strike an appropriate balance between social, environmental and economic concerns. We will extend our interventions in three additional landscapes.

Generate evidence related to the overall performances of landscape restoration practices in terms of restoring ecosystem functions:

The Ethiopian government is credited for being very proactive in terms of landscape restoration commitments and efforts. The country is also taking exemplary measures with regards to environmentally friendly green growth strategies. So far, the country has implemented restoration options for more than three decades and tremendous achievements have been observed. However, consistent and detailed studies related to the performances of large-scale watershed development interventions are lacking. In addition, most of the studies followed sectorial approach where 'achievements' are evaluated from a perspective of a single 'parameter' such as reduction in soil erosion, soil moisture enhancement, improvement in soil fertility, and the likes. As a result, quantitative and objective information on the

successes and challenges of the landscape restoration and SLM options are scant. The isolated evidences that consider single or few components do not provide the whole picture as either they undermine the true impact of land degradation and/or conceal the real picture of landscape restoration. We will conduct 'comprehensive' assessment of the impacts of interventions on overall ecosystem health and contributions in terms of ecosystems services and biodiversity at the national level. We will collate peer-reviewed publications that undertook assessment of impacts of restoration options and conduct meta-data analysis. The result can enhance informed decision making and planning as well as complement and promote government's reporting and negotiation concerning payment for ecosystem services. We will have this accomplished covering the national level.

Conduct meta-data analysis of soil erosion studies in Ethiopia:

Soil erosion is one of the most severe forms of land degradation in Ethiopia. Accordingly, various efforts have been undertaken to assess the risk and spatial dynamics of the problems. However, assessment results are very different undermining planning and informed decision making. Our effort here will be to conduct meta-data analysis by creating database of all peer-reviewed publications related to soil erosion assessment and modelling in the country. Based on the analysis results, we will suggest standardized approaches to derive some of the key soil erosion factors. This study will be at the national level.

Training and capacity development:

our discussions with SLM at national level and Bureau of Agriculture in the Amhara region indicate the need to develop capacity their staff related to landscape management: planning, implementation, and evidence generation. The Amhara Bureau of Agriculture for instance indicated the existence of gaps especially lack of adequate evidence generation to document the impacts of interventions. Based on this, we provided one training on 'water harvesting' related interventions at Bahir Dar. The training further demonstrated the gap at the different levels, and we think further training will be essential. We will thus share our experiences related to integrated land and water management in the Amhara region.

Table 1. Major activities and deliverables until March 2019.

Activity	Deliverable	Time
Guideline to match 'options with context'	Framework, report	Nov. 2018
Meta-data analysis of soil erosion studies	Database, analysis report	Dec. 2018
Meta-data analysis of restoration impacts	Database, analysis report	Dec. 2018
Scale technologies, guidelines, tools, models	Report	All season
Action research in 'climate-smart' villages	Photos, data, reports	All season
Training, capacity development	Training material, report	Dec. 2018
Presentations in scientific forum	Report, Poster, ppt.	Various times

Budget details

Indicative budget – until end of March 2019

Table 2. Estimated budget to implement activities until the end of Feb. 2018

Item	Budget (USD)
Staff time (CIAT)	18000
Research assistant	1280
Consultant to support aspects of tool development	2000
Staff time (Mekelle University)	3000
RARIS and SLM staff (help implement, supervise activities)	4836
Trainings and capacity development	1680
Gauging station for watershed level sediment monitoring	4600
Vehicle mileage and fuel	2500
Per diem (4 people for 20 days of the 6 months)	3260
Accommodation (4 people for 20 days of the 6 months)	1800
Workshop (travel, hotel, etc.)	2000
Office facilities, communication, printing	1800
Sub-total	46756
Overhead (12%)	5610.72
Total	52,366.72